breakout ABSTRACT

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TITLE

The Health and Environment Linked for Information Exchange (HELIX)–Atlanta Effort: Air Pollution and Birth Defects Demonstration

THEME

Advance Environmental Public Health Science and Research

KEYWORDS

HELIX–Atlanta, air pollution, birth defects, heart defects

BACKGROUND

The Environmental Public Health Tracking Branch of the National Center for Environmental Health, Centers for Disease Control and Prevention (CDC) is leading Health and Environment Linked for Information Exchange–Atlanta (HELIX–Atlanta), a collaborative effort to build a local environmental public health tracking network that integrates non-infectious health and environmental information systems.

OBJECTIVE(S)

The HELIX–Atlanta Birth Defects Team is conducting an ongoing demonstration project to integrate ambient air pollution data with the underlying cohort of births and fetal deaths occurring in metropolitan Atlanta (Clayton, Cobb, DeKalb, Fulton, and Gwinnett counties). This project was motivated by the results of Ritz et al. (2002), who reported associations between ambient air pollution and congenital heart defects in California.

METHOD(S)

The cohort of live births and fetal deaths during 1994–2002 has been obtained from vital records. Key information includes date of birth or fetal death, gestational age, and geocoded maternal address (latitude and longitude). Congenital heart defects have been ascertained by the Metropolitan Atlanta Congenital Defects Program, an active surveillance system operated by the National Center on Birth Defects and Developmental Disabilities (NCBDDD), CDC, which covers five-county Atlanta. These two data sets are linked on an ongoing basis at NCBDDD. Using gestational age information, days 16–43 of development have been estimated for each member of the cohort. This four-week period is presumably the most important gestational period for heart development. Measurements of ambient air pollution levels have been provided by the U.S. Environmental Protection Agency (retrieved from the Air Quality System). Ambient levels of carbon dioxide, nitrogen dioxide, ozone, particulate matter less than 2.5 microns in diameter ($PM_{2.5}$), and sulfur dioxide have been characterized using four approaches: 1) use of a centrally located monitor; 2) averaging across multiple monitors; 3) assignment based on proximity of maternal residence to the nearest monitor; and 4) geostatistical surfacing (ozone measurements only). Researchers at the National Aeronautics and Space Administration performed the ozone surfacing and provided derived $PM_{2.5}$ from satellite data to complement observed measurements. A modified version of the Congenital Heart Surgery Nomenclature and Database Project is currently being developed to classify infants with heart defects and to group embryologically similar cases together for etiologic surveillance. The geocoded maternal address data will be validated using a geographic information system (GIS) to integrate tax parcel data with orthophoto data

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purchased from the U.S. Geological Survey. When the location of a residence cannot be determined using a GIS, field measurements will be obtained using a global positioning system.

RESULT(S)

The cohort has been integrated with ambient pollution by time for approaches 1) and 2) and by space*time for approaches 3) and 4). For each cohort member, an average of the pollution levels during days 16–43 of development was calculated.

DISCUSSION/RECOMMENDATION(S)

In this presentation we will describe the scientific rationale, methods, and lessons learned to-date from this demonstration project, specifically those relating to the integration of environment and health data, characterization of ambient pollution levels, classification of heart defects, and validation of the geocoded maternal address data.

Ritz et al. (2002). Ambient air pollution and risk of birth defects in Southern California. Am J Epidemiol;155:17–25.

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